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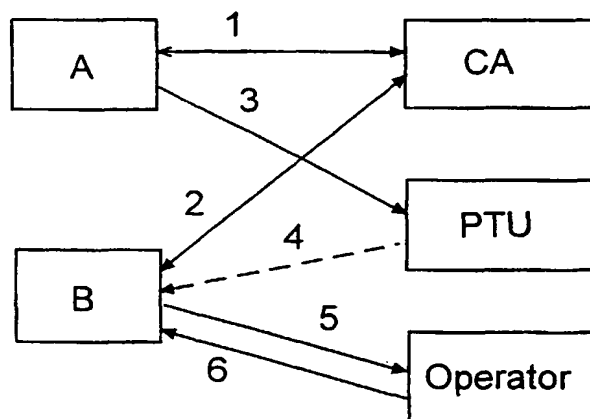
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(54) Title: DIGITAL PERMISSIONS FOR POSITIONING



(57) Abstract: The present invention relates to a wireless communication system and a procedure for secure management of position information between at least one supervised object (A) and a supervising object (B). Said objects (A, B) are preferably carried by supervised and supervising physical or juridical persons. The system according to the invention includes an operator and a position permission issuer (PTU) and is characterized in that the supervised object (A) is arranged, by means of a digital permission issued by the permission issuer (PTU), to provide/issue permission for/to the supervised object (B) to receive information about its geographical position, at which said operator has devices for providing the current position information for/to the supervised object (B). In one embodiment of the invention, the supervising object (B) must have the permission of the supervised object (A) each time it wants to derive information about the position of the supervised object (A), but the supervising object (B)

also can be provided with an authority from the supervised object (A), at which the supervising object (B) automatically receives information about the position of the supervised object (A).

## DIGITAL PERMISSIONS FOR POSITIONING

Field of the invention

The present invention relates to a system and a  
5 procedure for secure management of position information in  
a wireless communication network, and particularly such a  
system and procedure that includes digital permissions.

Background of the invention

10 It is in many connections desirable to have  
possibility to obtain information about, for instance, a  
person's geographical position, and position based services  
are expected to be very important for the third generation  
mobile telephone systems, due to, for instance, that in  
15 those systems very great demands are made upon accuracy in  
the position information.

Positioning equipment in combination with mobile radio  
systems consequently is creating a lot of new services. For  
some of these services which are executed in real time,  
20 permission for provision of the position information can be  
managed in a comparatively simple way. In other cases,  
where the service is not initiated by the user when it  
shall be utilized, some form of secure and well structured  
management of permissions and which include the possibility  
25 to create semipermanent position permissions.

The American patent US 6,072,396 shows a device and a  
method to supervise and trace people by means of a mobile  
telephone system, at which position information is  
collected in a central unit which then can present the  
30 information. Further, US 6,072,396 shows a device which  
includes, for instance, measuring of blood pressure and  
pulse, at which this information is collected and  
transmitted to the central unit.

The international patent application WO 00/16288 shows  
35 a system for watch and supervision of persons who need help  
or protection. The supervised person carries a transmitter

which transmits signals over a mobile communication network. The signals contain information about position and identity and are stored in a central unit. After that, the information is accessible in the central unit to an  
5 authorized person or public authority.

The Japanese patent JP 11258325 shows a device and a procedure for supervision of a child's or animal's geographical position. The position information is transmitted via a mobile telephone system to a supervision  
10 center.

Previous systems are based on that the one who shall provide position information creates an internal database for all users. This database must be maintained, and for each user all instances and/or persons, who are authorized  
15 to request the user's current position and under which premises, have to be entered. To maintain a database of this kind is both complicated and expensive and the risk of mistakes are obvious. If information is wrongly provided, there also may be a risk of claim for damages.

20

#### Aim of the invention

The present invention aims at solving above problems by creating a secure and flexible PKI-based (*PKI, Public Key Infrastructure*), wireless communication system to  
25 manage the provision of position information.

Another aim of the present invention is to create a possibility to separate the issuing of permission and the responsibility for positioning from that operator who is responsible for the operation of the communication system  
30 and who extracts and forwards the position information in question.

#### Summary of the invention

The present invention consequently relates to a  
35 wireless communication system and a procedure for management of position information between at least one

supervised object and one supervising object. Said supervised object is preferably carried by a supervised person, and said supervising object by a supervising person, at which said persons are physical or juridical persons.

The system according to the invention includes an operator and an issuer of position permission and is characterized in that the supervised object is arranged to, by means of a digital permission issued by the permission issuer, provide permission for/to the supervised object to receive information about its geographical position, at which said operator has devices to provide the current position information for/to the supervising object.

The system according to the invention is preferably PKI-based and the supervised object and the supervising object further can be identified by means of digital identities, at which the digital identities consist of digital certificates issued by a Certificate Authority.

In one embodiment of the invention, the supervising object must have the permission of the supervised object each time it wants to derive information about the position of the supervised object, but the supervising object can also be equipped with an authorization from the supervised object, at which the supervising object is arranged to automatically receive information about the position of the supervised object without the supervised object each time needing to provide its permission.

Further, the digital permission is arranged to consist of an attribute certificate and include information about the permission issuer, to whom the permission has been issued, that is, to which supervising person the permission has been issued, and possibly also a description of the supervised object and the supervised person.

In one more embodiment, the position permission issuer and the operator are arranged as one unit and preferably

the system according to the invention is a mobile telephone system.

#### Brief description of drawings

5       The present invention will be described in more detail with reference to enclosed figures, in which Figure 1 shows a schematic outline of an embodiment of the system according to the invention; and Figure 2 shows a schematic outline of another embodiment of  
10       the system according to the invention.

#### Detailed description of the invention

      The present invention consequently relates to a wireless communication system for management of the  
15       provision of position information between a supervised object A and a supervising object B. At which the supervised object A and the supervising object B preferably are carried by supervised respective supervising physical or juridical persons.

20       One embodiment of the system according to the invention is shown in Figure 1. In this embodiment traditional PKI is utilized, where a supervised object A and a supervising object B have received digital certificates from any Certificate Authority (CA). This is  
25       illustrated in Figure 1 by the arrows 1 and 2. These steps, however, are not necessary in the cases when the objects A and B already are equipped with digital certificates or any other digital identification by means of which they can be identified. When the person who is carrying the supervised  
30       object A wants to issue permission to the person who is carrying the supervising object B to receive the position of the object A, the object A establishes contact 3 with a position permission issuer, designated by the abbreviation PTU in Figure 1. PTU has much the same function as a  
35       traditional Certificate Authority (CA). The supervised object A has to authenticate itself to the permission

issuer PTU and after that, the object A can instruct the PTU to issue a digital permission to the supervising object B. The digital permission is an attribute certificate which, for instance, includes information about the permission issuer PTU, to whom the permission has been issued, that is to which supervising object B or person the permission has been issued, description of the supervised object A, and possibly also information about the person who is carrying the object A, but other information is also possible. Further, the issued digital permission is signed by/with the private key of the PTU. The issued digital permission after that either can be transmitted (according to the dashed arrow 4 in Figure 1 and 2) to the supervising object B to which it issued, or the digital permission can be made publicly accessible by means of, for instance, one or more, more or less, public catalog services. When the supervising object B, which has received permission to derive information about the position of the supervised object A, wants to do this, object B establishes contact with an operator. The operator is the one who is responsible for the operation of the communication network which is used for transmission/provision of position. Said operator preferably is a telecommunication operator in a communication network for mobile telephony. Further, it is the operator who, by means of databases and communication means, extracts and forwards the current position information and who receives the digital permission either from the supervising object B, or from the more or less public catalog service. Said position information the operator can get in known way from, for instance, GPS (Global Positioning System) or from information about the geographic location of base stations.

In another embodiment of the invention, which is illustrated in Figure 2, the position permission issuer PTU and the operator consist of one and the same unit. The operator's task is to authenticate the supervising object B

by means of, for instance, traditional PKI-based methods or by other methods which can guarantee the authenticity of the object B. Further, the operator checks if the supervising object B has permission to receive the position of the supervised object A by checking the authenticity and validity of the digital permission by means of a origin certificate provided by the permission issuer PTU. If the digital permission is both authentic and valid, the operator transmits the position of the supervised object A to the supervising object B.

The supervised person and the supervised object A can any time revoke the permission of the supervising object B to receive the position of the object A. These revocations of permissions can be saved in so called revocation lists, which are accessible to the operator so that he/she can check the validity of a permission. The operator can either on a regular basis derive these revocation lists, or online check can be performed.

In a system according to the invention it further can be desirable that others than the supervised object A can initiate the issuing of the position permission. This can, for instance, be the case when parents want to supervise the position of their children under age, or, for instance, when relatives want to supervise the position of their relatives suffering from senile dementia. The parents or the relatives who in this example carry the supervising object B then can ask for permission to supervise their children respective their relatives suffering from senile dementia who carry the supervised object A. Request for permission then can be made directly from, for instance, the position permission issuer PTU. Request for permission, however, must be dealt with in a very careful and secure way, because the position as such can be regarded as very delicate and insulting to integrity when ending up at wrong persons.

Further, it can in the system according to the invention be to advantage if the person who carries the supervising object B can get an authorization directly from the supervised object A. This authorization then the supervising object B shows to the position permission issuer, PTU. On basis of the authorization the PTU can issue an authorization for the object B to receive the geographic position of the object A. The authorization in question can, for instance, be framed as a standard contract which the person who carries the object A can sign by means of his/her digital signature. This approach is of specific advantage when minimal initiative from the person who carries the supervised object A is wanted.

In one more embodiment of the system according to the invention the digital permission has been extended by different additional attributes; the permission can, for instance, include information about between which points of time of a day and during which week days it is valid. Further, the permission can be provided with information regarding position accuracy, for instance if the person who is carrying the object B with its current digital permission can have position information with an accuracy of resolution of, for instance, 50 m, 1 km or 1 (Swedish) mile.

In the system according to the invention, it is further of advantage if the digital permissions include the identities of the persons who carry the objects A and B, and preferably also A's MSISDN or any other network address, such as an IP-address for GPRS/UMTS. Identities preferably are made up of the civic numbers and names of the persons, but other information which unequivocally identify the persons and the objects can of course also be used.

In the embodiment of the invention shown in Figure 1, the position permission issuer PTU and the operator are two different units. This is of specific advantage because the



operator, that is the organization which is responsible for among other things the operation of the communication network, then can sell position information, but locate issuing of permissions to/on one or more organizations.

5 Consequently the present invention will be possible to use for most services where the service provider is separated from the operator. The invention is especially useful for services of the type person-to-person positioning. As examples can be mentioned positioning/position finding of:

- 10 - members of the family;  
- drivers by profession, such as mailmen, taxi drivers, policemen or truck drivers;  
- pals.

Another example is position depending so called PUSH-  
15 services, that is services where a certain information shall be transmitted at a certain occasion to a certain user, and where the content shall be dependent on where the user is. This can, for instance, be the case at automatic mediation of taxi customers to vacant cars, that is, when a  
20 taxi registers itself as vacant, the driver will automatically have information about where the nearest customer is. Another example can be drivers by profession who in a new town/city want to know where the nearest gas station, workshop or restaurant is. For instance a trucker  
25 would be able to indicate at which times he wants his meals, and the system according to the invention could be used to at these points of time indicate where the nearest restaurant is located.

In the system according to the present invention it is  
30 further possible to provide position permission issuers PTU which are directed to public authorities. These will, for instance, give policemen permission to find out the geographical position of a user suspected of crime, at which this positioning can be executed without the operator  
35 needing to be involved in each individual case.

The present invention has only been described by means of exemplifying embodiments and it should be understood that other embodiments are possible without ending up outside the frame of the concept of invention, which is  
s only limited by enclosed patent claims.

## PATENT CLAIMS

1. A wireless communication system for management of position information between at least one supervised object (A) and a supervising object (B), including an operator and a position permission issuer (PTU) characterized in that the supervised object (A) is arranged, by means of a digital permission issued by the permission issuer (PTU), to provide the supervising object (B) with a permission to receive information about the geographical position of object (A), at which said operator has devices to provide the current position information for/to the supervising object (B).
2. System as claimed in patent claim 1, characterized in that it is PKI-based.
3. System as claimed in any of the previous patent claims, characterized in that the supervised object (A) and the supervising object (B) are arranged to be identified by means of their digital identities.
4. System as claimed in patent claim 3, characterized in that said digital identities are arranged to be made up of digital certificates issued by a Certificate Authority (CA).
5. System as claimed in any of the previous patent claims, characterized in that the supervising object (B) must have the permission of the supervised object (A) each time it wants to derive information about the position of the supervised object (A).

6. System as claimed in any of the patent claims 1-4,  
c h a r a c t e r i z e d in that a supervising object  
(B) is provided with an authority from the supervised  
object (A), at which the supervising object (B) is  
5 arranged to automatically receive information about  
the position of the supervised object (A) without the  
supervised object (A) each time being needed to  
provide its permission.
- 10 7. System as claimed in any of the previous patent  
claims, c h a r a c t e r i z e d in that the digital  
permission is arranged to be made up of an attribute  
certificate and include information about the  
permission issuer (PTU), to which supervising object  
15 (B) the permission has been issued, and possibly also  
a description of the supervised object (A).
8. System as claimed in any of the previous patent  
claims, c h a r a c t e r i z e d in that the position  
20 permission provider (PTU) and the operator are  
arranged as one unit.
9. System as claimed in any of the previous patent  
claims, c h a r a c t e r i z e d in that said  
25 communication system is a mobile telephone system.
10. Procedure for management of position information  
between at least one supervised object (A) and a  
supervising object (B), in a wireless communication  
30 system including an operator and a position permission  
issuer (PTU), c h a r a c t e r i z e d in that the  
supervised object (A) provides permission for/to the  
supervising object (B) to receive information about  
the geographical position of object (A), by means of a  
35 digital permission issued by the permission issuer

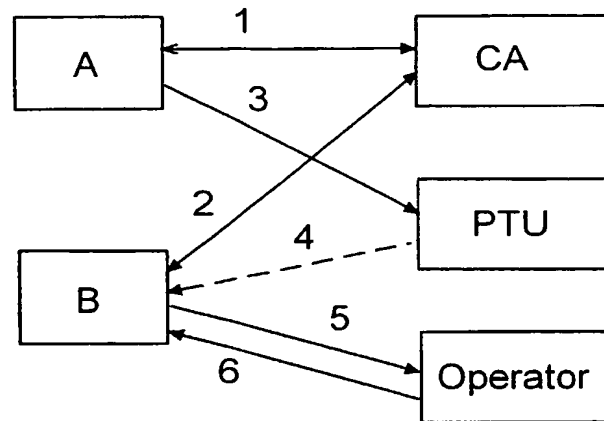
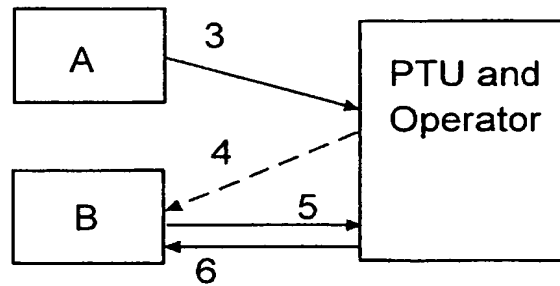
(PTU), at which said operator provides the current position information to the supervising object (B).

11. Procedure as claimed in patent claim 10,  
5 c h a r a c t e r i z e d in that the permission issuer (PTU) and/or the operator identifies the supervised object (A) and the supervising object (B) by means of their digital identities.
- 10 12. Procedure as claimed in patent claim 11,  
c h a r a c t e r i z e d in that a Certificate Authority (CA) issues said digital identities.
13. Procedure as claimed in any of the patent claims 10-  
15 12, c h a r a c t e r i z e d in that the supervising object (B) needs the permission of the supervised object (A) each time it wants information about the position of supervised object (A).
- 20 14. Procedure as claimed in any of the patent claims 10-  
12, c h a r a c t e r i z e d in that the supervising object (B) automatically receives information about the position of the supervised object (A) without the supervised object (A) each time being needed to  
25 provide its permission, because the supervising object (B) has an authority from the supervised object (A).
15. Procedure as claimed in any of the patent claims 10-  
14, c h a r a c t e r i z e d in that the digital  
30 permission is provided with information about the permission issuer (PTU), to which supervising object (B) the permission has been issued, and possibly also a description of the supervised object (A).
- 35 16. Procedure as claimed in any of the patent claims 10-  
15, c h a r a c t e r i z e d in that the position

permission issuer (PTU) and the operator are arranged as one and the same unit.

17. Procedure as claimed in any of the patent claims 10-  
5 16, c h a r a c t e r i z e d in that the position  
information is transmitted by means of a mobile  
telephone system.

1/1

**Figure 1****Figure 2**

## INTERNATIONAL SEARCH REPORT

International application No.

PCT/SE 02/00255

## A. CLASSIFICATION OF SUBJECT MATTER

IPC7: H04Q 7/38

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC7: H04Q

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-INTERNAL, WPI DATA

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

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X	WO 0038467 A1 (TELEFONAKTIEBOLAGET LM ERICSSON), 29 June 2000 (29.06.00), page 5, line 26 - line 28; page 9, line 9 - page 10, line 19; page 11, line 9 - line 20, page 12, line 9 - line 13; claims 1-3; abstract --	1-17
A	WO 0051391 A1 (TELEFONAKTIEBOLAGET LM ERICSSON), 31 August 2000 (31.08.00), abstract --	1-17

☒ Further documents are listed in the continuation of Box C.☒ See patent family annex.

\* Special categories of cited documents:

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"P" document published prior to the international filing date but later than the priority date claimed

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"X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&amp;" document member of the same patent family

Date of the actual completion of the international search

27 May 2002

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## INTERNATIONAL SEARCH REPORT

International application No.

PCT/SE 02/00255

## C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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Form PCT/ISA/210 (continuation of second sheet) (July 1998)

## INTERNATIONAL SEARCH REPORT

Information on patent family members

01/05/02

International application No.

PCT/SE 02/00255

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